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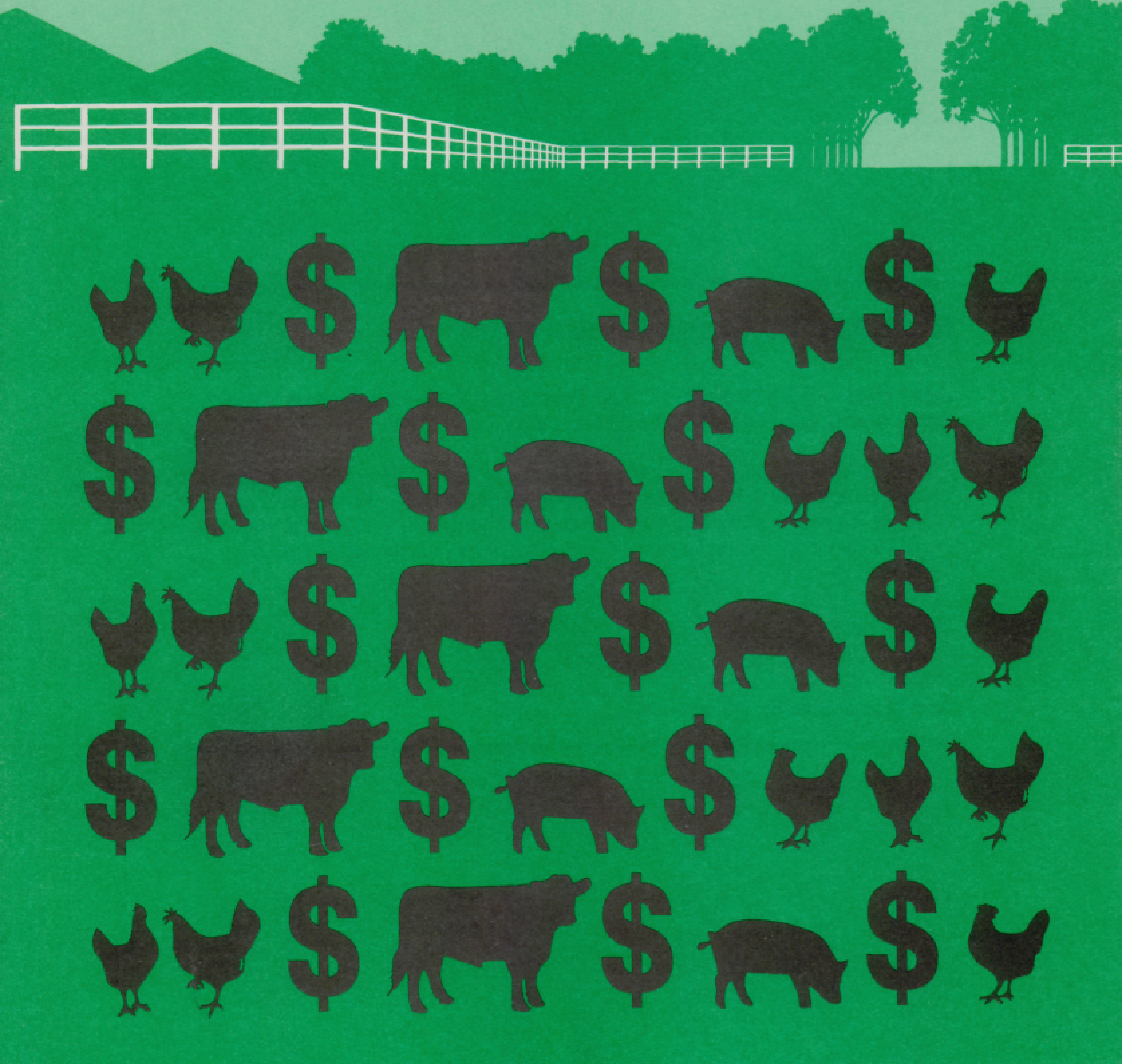
Changes in the Red Meat and Poultry Industries

Their Effect on Nonmetro Employment

Dennis M. Brown



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Abstract

This report describes changes in the red meat and poultry industries and assesses the potential of these industries for creating economic growth in the nonmetro United States. Growth in the red meat and poultry industries is not expected to be evenly spread throughout the Nation. The red meat packing industry is expected to continue growing in selected rural counties of the Plains States and the Corn Belt. And, poultry processing is expected to continue growing in areas of the Delmarva Peninsula, the Southeast, and Arkansas and Texas. Input-output analysis is used to examine the local effect of changes in final demand for meat products in areas with important red meat and poultry industries. Direct, indirect, and induced employment effects are explored. Because of greater labor intensity in poultry processing, the local employment effect of a change in final demand for meat products is larger for areas specializing in the poultry industry than for those areas specializing in the red meat industry.

Keywords: Production, processing, final demand, direct employment effect, indirect employment effect, induced employment effect, labor intensity.

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Contents

Summary

This report describes changes in the red meat and poultry industries and assesses the impact of these changes on selected regional economies. Since the mid-1970's, the red meat industry has undergone industrial and geographical restructuring as processors sought to reduce costs during a period of decreasing per capita consumption of red meat products. Both employment and the number of plants have declined.

Although some counties specializing in the red meat industry have experienced growth, this has come largely from a movement of the processing activity to lower cost areas nearer the source of raw inputs. Due to increased per capita consumption, employment and output in the poultry industry have grown significantly, largely at the expense of the red meat industry. This growth has led to gains in employment, real per capita income, and population for a number of counties in the major poultry regions: the Delmarva Peninsula, the Southeast, and Texas/Arkansas.

Input-output analysis is used here to assess the regional employment effect of changes in final consumer demand for meat products in the red meat packing and poultry processing industries. The results show that because of greater labor intensity in poultry processing, the *direct* employment effect (the number of meat processing jobs added) of a $100-million change in consumer demand for processed meat was larger for the poultry industry than for the red meat industry (that is, for the same change in demand, more jobs in the poultry processing industry were created than were created in the red meat packing industry). And, since the *indirect* effect (the number of jobs added to the suppliers of meat processing industries) was also larger, this, in turn, led to a greater *induced* employment effect (the number of jobs added to the rest of the economy) for the poultry industry. Therefore, the *overall* effect was larger, in the creation of economic benefits, for the poultry processing industry. However, employment multipliers reveal that as demand for processed meat increases, the local effect of each additional processing job is not significantly different for the poultry industry than for the red meat industry.

Introduction

Employment trends of the 1980's show that the red meat packing and poultry processing industries are among the very few food processing industries expected to have significant employment growth in rural counties during the 1990's (3).[1] This growth, however, is not expected to be evenly spread throughout the Nation. Red meat packing is expected to continue growing in selected rural counties of the Plains States and the Corn Belt, while no growth is expected in metro counties (1). And, poultry processing is expected to continue growing in areas of the Delmarva Peninsula (of Delaware, Maryland, and Virginia), the Southeast (primarily in Alabama, Georgia, Mississippi, and North Carolina), and in Arkansas and Texas (4).

The study reported here assesses the potential of the meat processing industries for creating economic growth in counties with significant activities in both production and processing in the red meat or poultry industries. The report initially describes the structural and spatial changes that have taken place in the red meat packing and poultry processing industries since the mid-1970's. Changes in the number of jobs and the number of establishments are highlighted in the context of changing consumption patterns. Next, counties with significant production as well as processing activities in the red meat or poultry industries are identified (also referred to as red meat and poultry counties) and are then compared, using a number of economic measures. Finally, input-output analysis is used to assess the potential of these two industries for creating economic growth in the nonmetro United States.

The Red Meat Packing Industry

The red meat packing industry is considered first, with the structure and location of the industry described in some detail.

Industrial Structure

Since the mid-1970's, the red meat packing industry has significantly contracted both in terms of employment and establishments. The industry, accounting for about 0.1 percent of all jobs in the Nation, had some 160,000 employees in 1975 but only about 118,000 by 1988, a decrease of 26 percent (table 1) (21). The number of establishments fell from 2,289 in 1975 to 1,359 in 1988, a 41-percent decline.

Industry trends emphasize that the red meat packing industry has become increasingly more concentrated in nonmetro counties, both in terms of employment and number of establishments. Nationwide, metro counties lost nearly 49,000 red meat packing jobs during 1975-88, while nonmetro counties gained about 7,000 jobs. The share of red meat packing jobs in nonmetro counties rose from one-third to more than one-half between 1975 and 1988. And, during this period, both metro and nonmetro counties lost a large number of red meat packing establishments (536 and 394), but by 1988, a larger number of establishments were in nonmetro counties because more establishments were lost in metro counties.

Since the mid-1970's, per capita consumption of red meat products has also fallen (fig. 1). Per capita consumption of all red meat products was 126 pounds in 1975, falling to 114 pounds by 1991 (11).[2] This decline explains why the market share for red meat products has decreased, falling from 74 percent of all meat consumed in 1975 to 61 percent in 1991.

The two most important components of the red meat industry are beef and pork. Beef's market share declined from 66 percent of all red meat products in 1975 to 56 percent in 1991, but pork had a relative gain, with its increased share roughly equivalent to the decline in beef (11).[3] These changes are also reflected in production figures. In 1990, for example, some 7.6 million fewer head of cattle were sold than in 1975, a decline of 14 percent (17). In contrast, 15.8 million more hogs were sold in 1990 than in 1975, an increase of 21 percent.

Since the mid-1970's, the red meat packing industry has experienced a considerable amount of restructuring, characterized by an increasing degree of industrial concentration. Inefficient plants were closed, labor was replaced with capital (reducing

[1]The Standard Industrial Classification (SIC) codes for red meat packing and poultry processing are 2011 and 2015. Underscored numbers in parentheses refer to items listed in References.

[2]"Meat products" refers to the boneless equivalent, exclusive of all bone and fat normally trimmed before retail sale.

[3]The year 1975 was selected based on data considerations. However, during the 1970's, 1975 was close to the peak year for cattle sales but a low point for hog sales.

Table 1—Changes in employment and establishments in the red meat packing industry by farm production region, 1975-88

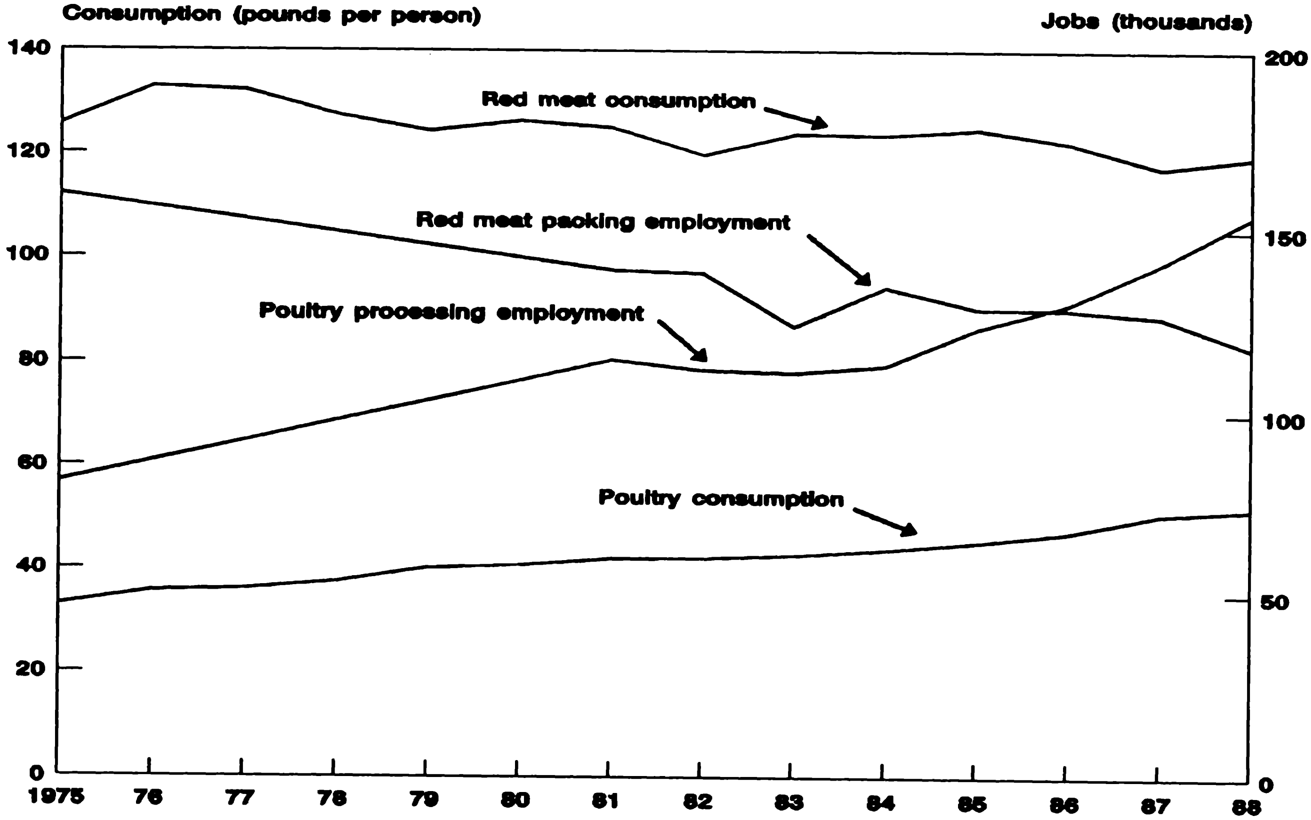
Region	1988			1975-88 change			1975-88 change		
	Metro	Nonmetro	Total	Metro	Nonmetro	Total	Metro	Nonmetro	Total
	Number						Percent		
Employees:									
United States	56,020	62,253	118,273	-48,925	7,102	-41,823	-46.6	12.9	-26.1
Appalachia	5,031	7,505	12,536	-4,211	409	-3,802	-45.6	5.8	-23.3
Corn Belt	16,718	12,443	29,161	-12,006	-1,326	-13,332	-41.8	-9.6	-31.4
Delta	757	2,703	3,460	-1,282	-483	-1,765	-62.9	-15.2	-33.8
Lake	3,949	6,347	10,296	-8,697	-1,317	-10,014	-68.8	-17.2	-49.3
Mountain	4,329	3,642	7,971	-2,617	211	-2,406	-37.7	6.2	-23.2
Northeast	4,166	1,537	5,703	-6,549	417	-6,132	-61.1	37.2	-51.8
Northern Plains	7,059	19,152	26,211	-5,793	9,401	3,608	-45.1	96.4	16.0
Pacific	5,502	473	5,975	-3,269	-653	-3,922	-37.3	-58.0	-39.6
Southeast	2,220	2,603	4,823	-1,947	-1,244	-3,191	-46.7	-32.3	-39.8
Southern Plains	6,289	5,848	12,137	-2,554	1,687	-867	-28.9	40.5	-6.7
Establishments:									
United States	651	708	1,359	-536	-394	-930	-45.2	-35.8	-40.6
Appalachia	63	77	140	-34	-65	-99	-35.1	-45.8	-41.4
Corn Belt	138	152	290	-87	-76	-163	-38.7	-33.3	-36.0
Delta	17	54	71	-23	-34	-57	-57.5	-38.6	-44.5
Lake	56	57	113	-63	-32	-95	-52.9	-36.0	-45.7
Mountain	43	66	109	-35	-43	-78	-44.9	-39.5	-41.7
Northeast	116	44	160	-138	-25	-163	-54.3	-36.2	-50.5
Northern Plains	26	81	107	-18	-37	-55	-40.9	-31.4	-34.0
Pacific	82	32	114	-59	-19	-78	-41.8	-37.3	-40.6
Southeast	45	66	111	-38	-30	-68	-45.8	-31.3	-38.0
Southern Plains	65	79	144	-41	-33	-74	-38.7	-29.5	-34.0

Note: The terms "nonmetro" and "rural" are used interchangeably in this report.

Source: (21).

Figure 1

Consumption of meat products and employment in meat processing, 1975-88



Sources: (11,21)

the relative strength of organized labor), and operations were consolidated through mergers and acquisitions. For example, the share of marketed cattle slaughtered by the four largest firms rose from 24 to 53 percent between 1975 and 1991 (18).

Both employment and the number of plants in the industry have declined, with heavy losses in metro counties, as red meat packing operations have become more concentrated in larger rural plants. One outcome of this shift was a 29-percent decline in real wages for red meat packing production workers between 1975 and 1990 (fig. 2).[4] This wage decline contrasts with a slight increase in real wages for all U.S. manufacturing industries. Declining red meat packing wages probably reflect lower wages and less unionization in rural areas, where the industry has become more heavily concentrated.

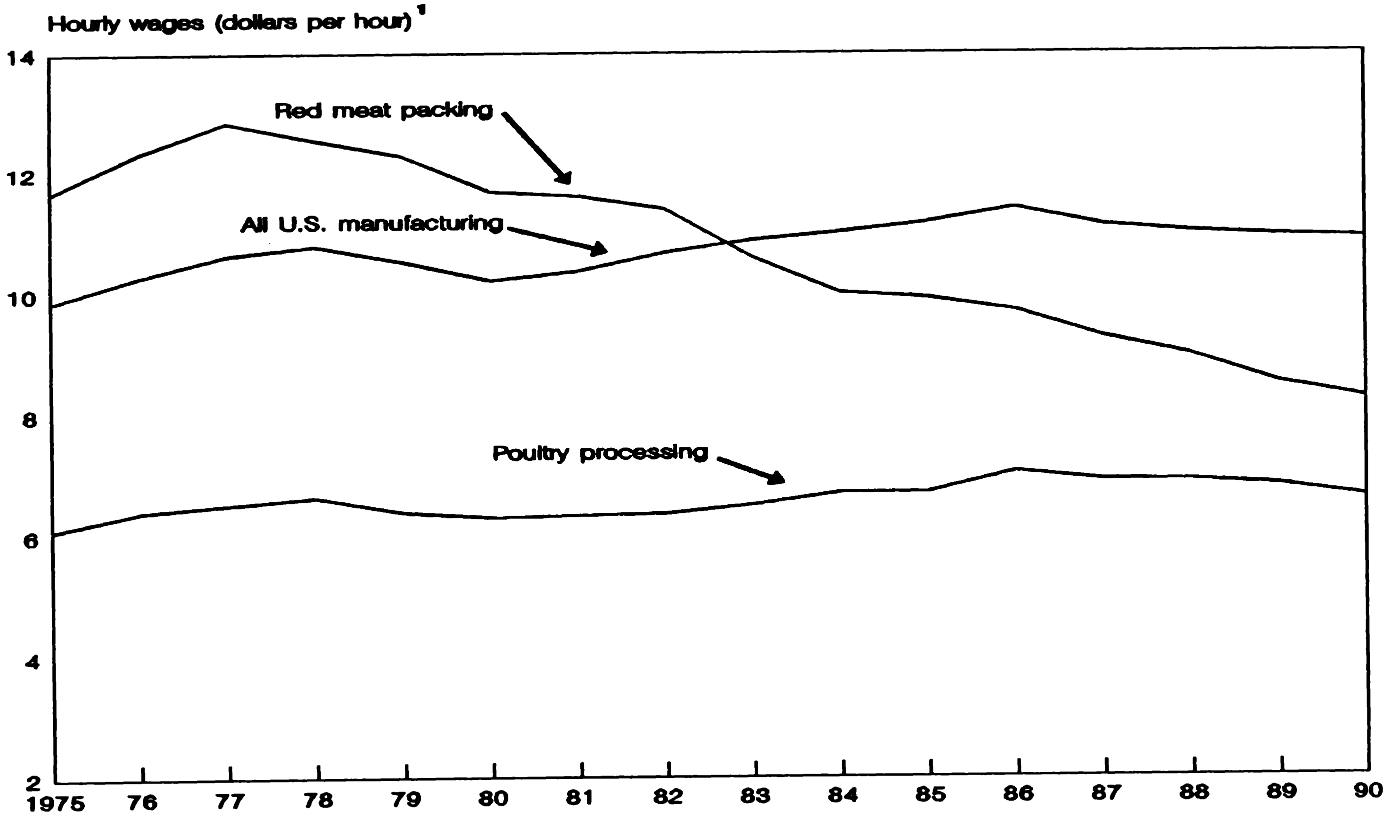
[4]Adjusted for inflation, using the implicit price deflator for nondurable goods (24).

Location of the Industry

Two regional shifts have taken place in the red meat industry since the mid-1970's (table 1). First, the industry has shifted away from metro counties in the western Corn Belt (Iowa and Illinois) and Lake States (southern Minnesota and Wisconsin) to nonmetro counties in the Northern and Southern Plains (Nebraska, Kansas, and the Texas Panhandle). Between 1975 and 1988, metro counties in Iowa, Illinois, Minnesota, and Wisconsin lost over 14,000 red meat packing jobs (more than half of 1975 employment in the industry), while nonmetro counties in Nebraska, Kansas, and Texas gained over 13,000 jobs (more than doubling the 1975 industry employment) (21). In relative terms, metro counties in Iowa, Illinois, Minnesota, and Wisconsin accounted for 18 percent of all red meat packing jobs in the Nation in 1975 but only 12 percent in 1988. In contrast, only 7 percent of all red meat packing jobs were in nonmetro counties in Nebraska, Kansas, and Texas in 1975,

Figure 2

Real wages in meat processing and in all U.S. manufacturing, 1975-90



[1]In 1990 dollars. Source: (19)

but nonmetro counties in these three States accounted for 20 percent of all jobs in the industry by 1988.

In the second regional shift, red meat packing employment in the Northern and Southern Plains has moved from metro to nonmetro counties. Although this shift is relatively smaller, metro Plains counties in Kansas, Nebraska, and Texas still lost a large number of jobs (nearly 4,000, or 24 percent of employment in the industry between 1975 and 1988), with many of these jobs moving to nonmetro Plains counties. The largest metro losses occurred in eastern Nebraska counties (largely driven by the industry's movement out of Omaha), with large nonmetro increases in other Nebraska counties, western Kansas, and the Texas Panhandle.

These regional shifts can be explained by three factors. First, as a result of merger activity and industrial restructuring, the beef and pork industries have become more cost-conscious, which has led to strong competition among counties for red meat packing jobs in the Northern and Southern Plains States, Corn Belt, and Lake States (5). Firms, wishing to reduce costs, have been drawn to nonmetro counties largely because both land and labor, important inputs in the industry, are cheaper there.

Second, cattle feeding operations have shifted from the western Corn Belt and Lake States to the Northern and Southern Plains States. In 1978, Iowa, Illinois, Minnesota, and Wisconsin, historically States with important red meat packing operations, accounted for 20 percent of national sales of fed cattle, but their share fell to just under 16 percent by 1987 (20). In contrast, the Plains States of Kansas, Nebraska, and Texas accounted for 43 percent of national sales of fed cattle in 1978, increasing to 49 percent by 1987. Among the reasons for this locational shift in cattle feeding operations are a decrease in the number of small, family-operated feedlot farms and cattle feeding operations in Iowa and Illinois and the pre-1986 Federal income tax laws favoring construction of large, corporate-owned cattle feedlots in the Plains States (7).

Finally, improvements and innovations in the red meat packing industry have allowed significant savings in transportation costs. For example, development of boxed beef (in which beef is packaged and shipped in smaller, more easily transportable, compact boxes) and improved refrigeration technologies have made red meat packing more "footloose," permitting the industry to be more flexible in the choice of where processing facilities are located. As a result, red meat packing activities have been able to keep transportation costs down by locating near the source of the raw inputs, the grain-fattened cattle in the Plains States.

As the industry continues to restructure and as red meat continues to account for a smaller share of all meat products consumed, pressure will be put on the industry to develop new products and to branch out into nontraditional areas. The development of precooked pork and new veal and lamb products, the arrival of "branded" fresh meats (in which consumers can directly identify the producer), and a movement toward a greater degree of consolidation between red meat producers and the poultry industry are expected to offer limited new opportunities for nonmetro job growth.

The Poultry Processing Industry

Next, the poultry processing industry is considered, with a discussion of its structure and major locations.

Industrial Structure

In contrast to overall employment declines in red meat packing, substantial job growth in the poultry processing industry has taken place, accompanied by increasing industry concentration. Between 1975 and 1988, while poultry processing employment nearly doubled, increasing from 81,000 to 154,000, the number of such processing establishments declined 16 percent, falling from 562 plants to 472 (table 2) (21).

Although poultry processing job growth in absolute terms was greater in nonmetro counties, growth rates were almost identical in metro and nonmetro counties. Between 1975 and 1988, metro counties gained some 24,000 jobs, while nonmetro counties gained nearly 49,000 jobs, an increase of around 90 percent for both groups of counties. And, since the mid-1970's, both metro and nonmetro counties lost between 14 and 19 percent of their poultry processing establishments. These trends reveal that the industry continues to be largely rural, with nonmetro counties accounting for about two out of every three jobs and more than half of all establishments.

The employment gains in poultry processing derive from an increased per capita consumption of poultry (fig. 1). Annual per capita consumption of poultry products grew from 33 pounds in 1975 to 58 pounds by 1991 (11). Young chickens (mostly broilers) account for 75-80 percent of all poultry consumed, with turkey and mature chickens making up the remainder (8).[5]

The increased per capita consumption of poultry has resulted in a considerable growth in production of broilers and turkeys. Broiler production grew from 3 billion birds raised in 1975 to nearly 5.9 billion in 1990, an average of 6-percent annual growth (17). Turkey production increased even faster, from 124 million birds raised in 1975 to more than 283 million in 1990, an average of 9-percent annual growth.

With greater per capita consumption of poultry, real wages for poultry production workers have also increased (fig. 2). For example, hourly poultry processing wages for nonsupervisory employees rose 9 percent in real terms between 1975 and 1990 (19). This increase is equivalent, in percentage terms, to the wage increase for all manufacturing industries in the United States and contrasts with declining real wages in the red meat packing industry. However, 1990 wages for poultry processing workers were still considerably below the U.S. manufacturing average.

Since the mid-1970's, three major factors have contributed to the substantial employment growth in the poultry industry. First, on a per capita basis, consumers have bought more poultry and less red meat, largely because of dietary and health issues. Poultry, because it is high in protein and low in fat content, represents a popular alternative to beef and pork (8). Second, poultry has benefited from increased consumption of convenience foods. Fast food restaurants and the frozen food industry have expanded the use of poultry in existing and new product lines because poultry is a flexible product, with a number of different product forms, including precut or further processed varieties. Also, poultry

[5]A broiler is a 3- to 5-pound chicken that is 6-8 weeks old at the time of slaughter.

Table 2—Changes in employment and establishments in the poultry processing industry by farm production region, 1975-88

Region	1988			1975-88 change			1975-88 change		
	Metro	Nonmetro	Total	Metro	Nonmetro	Total	Metro	Nonmetro	Total
	Number						Percent		
Employees:									
United States	50,313	103,781	154,094	23,998	48,893	72,891	91.2	89.1	89.8
Appalachia	6,541	22,429	28,970	2,880	12,658	15,538	78.7	129.6	115.7
Corn Belt	4,190	9,938	14,128	2,564	5,679	8,243	157.7	133.3	140.1
Delta	7,777	24,142	31,919	4,026	13,193	17,219	107.3	120.5	117.1
Lake	2,961	7,816	10,777	2,005	3,890	5,895	209.7	99.1	120.8
Mountain	1,051	204	1,255	593	142	735	129.5	229.0	141.4
Northeast	7,321	9,440	16,761	3,129	1,204	4,333	74.6	14.6	34.9
Northern Plains	2	2,112	2,114	-611	592	-19	-99.7	39.0	-.9
Pacific	6,424	1,098	7,522	3,404	-243	3,161	112.7	-18.1	72.5
Southeast	12,010	20,259	32,269	5,422	9,430	14,852	82.3	87.1	85.3
Southern Plains	2,036	6,343	8,379	586	2,348	2,934	40.4	58.8	53.9
Establishments:									
United States	206	266	472	-48	-42	-90	-18.9	-13.6	-16.0
Appalachia	18	37	55	-1	-1	-2	-5.3	-2.6	-3.5
Corn Belt	25	51	76	-14	-9	-23	-35.9	-15.0	-23.2
Delta	18	47	65	2	0	2	12.5	0	3.2
Lake	11	23	34	-6	-4	-10	-35.3	-14.8	-22.7
Mountain	4	4	8	-6	-1	-7	-60.0	-20.0	-46.7
Northeast	49	26	75	0	-17	-17	0	-39.5	-18.5
Northern Plains	1	12	13	-2	-3	-5	-66.7	-20.0	-27.8
Pacific	42	3	45	-9	-4	-13	-17.7	-57.1	-22.4
Southeast	33	50	83	-2	7	5	-5.7	16.3	6.4
Southern Plains	5	13	18	-10	-10	-20	-66.7	-43.5	-52.6

Source: (21).

is cheaper than either beef or pork. The average per pound retail prices of beef and pork were $2.88 and $2.12 in 1991, while the prices of both chicken and turkey ranged between $0.88 and $1.00 (13).

The fact that chicken and turkey represent a cheap, healthful, convenient alternative to red meat is reflected in the proportion of meat consumption accounted for by poultry. In 1975, poultry accounted for only 19 percent of all meat consumed. By 1991, poultry was the most popular meat product after beef, accounting for nearly 32 percent of total meat consumption (11).

Location of the Industry

The poultry industry, characterized by a high degree of vertical integration, has coordinated most stages of production, processing, and marketing through the same firm or as part of the same contractual arrangement (8). And, since birds do not travel well, production and processing activities usually occur within close geographic proximity to each other.

Three major poultry production and processing regions are found throughout the Nation, which mostly specialize in broilers, although turkeys are also important in some areas. These regions have experienced the greatest job growth in the industry since the mid-1970's. The first region is the Delmarva Peninsula of Delaware, Maryland, and Virginia, along with the smaller area of Virginia's Shenandoah Valley, which partly overlaps neighboring West Virginia. Second is the Southeast, where the industry is primarily concentrated in Alabama, Georgia, Mississippi, and North Carolina, with some activity in South Carolina and northern Florida. Third is Arkansas and northeastern Texas, with some overlap in Missouri and Oklahoma. Arkansas is the single largest producer of broilers, accounting for 16 percent of all broilers sold in the Nation in 1990 (17). California, which has a significant but relatively smaller broiler industry, also experienced some growth in employment and broiler sales. Minnesota and North Carolina accounted for about one-third of total 1990 U.S. turkey sales.

Several reasons account for the historical concentration of the poultry industry in these three major regions (4). First, these areas generally have mild or temperate climates. Consideration of the climate is important because heating costs have historically been an important determinant in the location of the poultry industry. Second, wage rates in these regions are generally lower than in other parts of the country because of a less unionized workforce and an abundant supply of unskilled labor. And, third, all three areas are relatively close to large, final demand markets, with Delmarva serving the markets of the Mid-Atlantic and the Northeast, the South serving markets in the Southeast, and Texas/Arkansas serving markets in the Midwest and the Southwest (with the western markets primarily being served by the California industry).

Growth can be expected as the industry responds to increasing per capita consumption of poultry products. More convenient varieties of poultry are likely to become more popular, including boneless poultry products such as ground turkey or chicken and turkey sausages, cutup poultry parts, and prepackaged chill-pack products (8). As the industry expands, however, the high initial investment will most probably limit the number of new entrants. As a result, the poultry industry is expected to remain concentrated among a relatively small number of firms, which control most of the phases of operation, including production, processing, and marketing. As an illustration of this point, in 1975, the top four broiler firms accounted for 18 percent of all broilers slaughtered under Federal inspection; by 1991, their share had grown to 41 percent (14).

Counties With Significant Production and Processing Components in the Red Meat and Poultry Industries

To assess the regional economic impact of changes in the red meat and poultry industries, we must first identify counties with significant production and processing components.[6] Four different criteria were used, and if a county met all of them since the mid-1970's, it was classified as having both significant production and processing activities. First, counties must have had at least 100 employees in either the red meat packing industry or the poultry slaughtering and processing industry in 1975 and 1988.[7] Second, counties had to have important farm production activity, with cattle, hog,

[6]The sources of information for production data were the 1978 and 1987 *Censuses of Agriculture* (20), and for employment data, enhanced files of the 1975 and 1988 *County Business Patterns* (21).

[7]This value and other thresholds were based largely on data considerations.

or poultry sales of at least $8 million in 1978 and $10 million in 1987. Third, cattle, hogs, or poultry had to be an important commodity in the county's agricultural base, with at least 20 percent of total agricultural sales being derived from one of these three commodities in 1978 and 1987. And, finally, to exclude those counties with large production and processing elements but with complex economic bases in which meat processing is only a very small part, the sum of employment in agriculture and meat processing (either red meat packing or poultry processing) had to account for at least 10 percent of the employment base of the county in 1975 and 1988.[8]

Using these criteria, we have identified 32 counties as having significant production and processing components in the red meat industry (app. table 1). These counties are clustered largely in the Northern and Southern Plains (Kansas, Nebraska, Colorado, and the Texas Panhandle) and the western Corn Belt (Iowa, Illinois, and Minnesota), and they accounted for 13 percent of the Nation's fed cattle and hog sales in 1987 as well as 28 percent of all red meat packing employment in 1988 (fig. 3).

In the poultry industry, we have identified 47 counties as having significant production and processing components (app. table 2). They are scattered throughout the Delmarva Peninsula, the Shenandoah Valley (Virginia and West Virginia), North Carolina, Georgia, Alabama, Mississippi, Oklahoma, Texas, and Arkansas, indicating that all major areas of concentration in the poultry industry are represented (fig. 3). And, they accounted for 31 percent of all U.S. poultry sales in 1987 and 41 percent of all poultry processing employment in 1988.

Comparing Past Rates of Economic Growth

Since the early 1970's, poultry counties have consistently had comparable or higher growth rates of employment, real per capita income, and population than red meat counties (table 3). In fact, the gap in economic growth rates between the two types of counties has widened since the early 1980's. For example, during the early 1970's, employment grew 13 percent in poultry counties, compared with 12 percent for red meat counties.

[8]Counties acquiring significant production and/or processing capabilities since 1975 would not meet these criteria.

By the late 1980's, however, while employment in poultry counties grew 14 percent, employment was up only 6 percent in red meat counties. During the early 1970's real capita income grew 20 percent in poultry counties, just below the 25-percent growth rate for red meat counties. By the late 1980's, though, real per capita income grew 11 percent in poultry counties but only 4 percent in red meat counties. And, during the early 1970's, population grew 10 percent in poultry counties, compared with 5 percent in red meat counties. But, during the late 1980's, while population grew 7 percent in poultry counties, the population actually declined 1 percent in red meat counties.

The divergence of past economic growth rates for poultry counties from red meat counties can be attributed, at least partly, to a regional effect. Nonmetro counties in the South (where most of the poultry counties are located) generally showed higher rates of economic growth in the 1970's and 1980's than nonmetro counties in the Midwest (where most of the red meat counties are located). This pattern is especially apparent during the recession of the early 1980's, when population in the midwestern nonmetro counties grew very little, and employment and real per capita income actually declined.

Assessing the Regional Economic Effect of Growth in Meat Processing

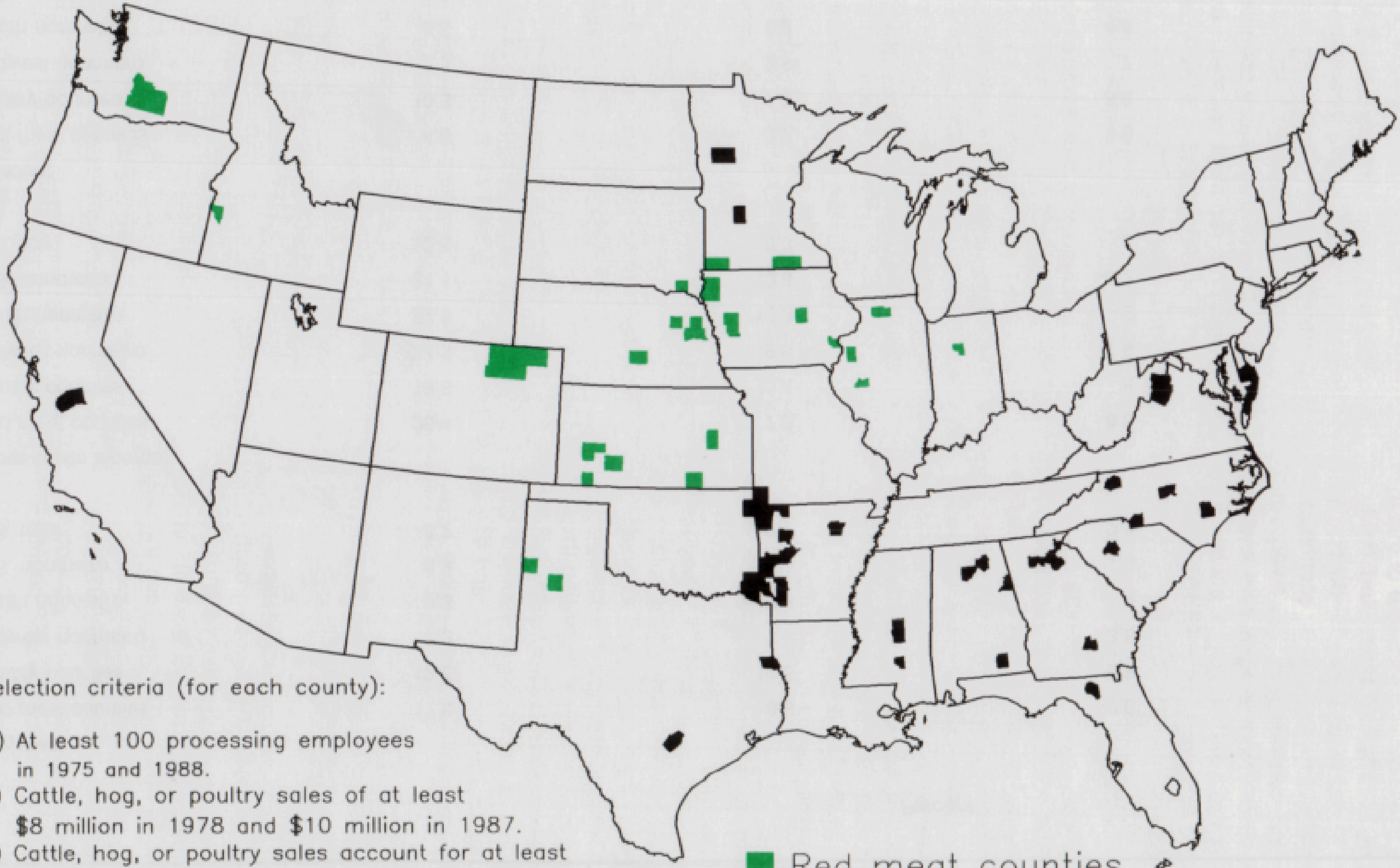
Further insight into each industry's potential to generate local economic growth was sought through the IMPLAN (Impact Analysis for Planning) system, a microcomputer-based, input-output model developed by the USDA Forest Service.[9] IMPLAN was used to assess regional effects caused by changes in the poultry and red meat industries. IMPLAN, by providing an accounting of interindustry and intersector transactions, estimates employment effects that come from changes in final consumer demand.[10]

IMPLAN was used to estimate the employment effect that would result from a $100-million increase in local final consumer demand in the red meat packing and poultry processing industries in

[9]For a more detailed discussion of input-output analysis, see (9) or (10).

[10]The database for IMPLAN is the 1977 county-level U.S. industrial structure, updated to 1985 prices for 528 industries.

Figure 3
Counties with significant production and processing components in the red meat and poultry industries, 1975–88



Selection criteria (for each county):

(1) At least 100 processing employees in 1975 and 1988.
(2) Cattle, hog, or poultry sales of at least \$8 million in 1978 and \$10 million in 1987.
(3) Cattle, hog, or poultry sales account for at least 20 percent of total agricultural sales in 1978 and 1987.
(4) Agriculture and meat processing account for at least 10 percent of total employment in 1975 and 1988.

Sources: (20, 21).

Table 3--Growth and decline in employment, real per capita income, and population in red meat and poultry counties, 1969-88

Economic indicator	Early 1970's (1969-73)	Late 1970's (1974-78)	Early 1980's (1979-83)	Late 1980's (1984-88)
		Percent		
Employment:				
Red meat counties	11.8	8.6	-0.6	5.9
Poultry counties	12.6	11.5	3.8	14.4
Midwest nonmetro	7.2	7.0	-3.5	5.1
South nonmetro	9.3	9.3	.4	6.4
U.S. nonmetro	8.9	9.4	-.6	6.8
U.S. total	8.2	9.7	2.3	10.9
Real per capita income:				
Red meat counties	25.4	7.8	-8.5	4.0
Poultry counties	19.6	13.4	.8	10.7
Midwest nonmetro	24.3	9.9	-7.6	4.4
South nonmetro	22.0	12.3	-.2	7.6
U.S. nonmetro	21.1	10.3	-3.2	6.6
U.S. total	12.5	10.3	.6	9.2
Population:				
Red meat counties	4.5	3.7	3.6	-.7
Poultry counties	10.3	7.7	5.8	7.1
Midwest nonmetro	3.5	2.9	.7	-.4
South nonmetro	5.5	6.2	4.6	1.5
U.S. nonmetro	5.3	5.5	3.6	1.3
U.S. total	5.0	4.1	4.3	4.0

Source: (22).

selected areas.[11] Although $100-million was chosen somewhat arbitrarily, this sum represents about three times the capital outlay needed for the development of a new poultry complex (including all phases of production and processing) (8).[12]

Because economic activity is not generally confined to the geographic boundaries of only one county but tends to be linked to a broader area, the multicounty Rand McNally "trading area" was used to measure the employment effect. Rand McNally trading areas are widely used by regional economists in both the public and private sector and are determined on the basis of population distribution, newspaper circulation, economic activities, transportation facilities, commuting patterns, physiography, and subjective analysis (12). Five trading areas in the red meat industry and five trading areas in the poultry industry have been selected, which encompass a number of red meat and poultry counties (app. table 3).

The results showed that an increase in final demand for meat products adds more jobs to the poultry processing industry than to red meat packing (table 4). For example, a $100-million increase in final demand in Harrison, Arkansas, adds 788 jobs to the poultry processing industry. And, in Salisbury, Maryland, where the effect is even stronger, the same increase in final demand adds 910 poultry processing jobs. In contrast, a $100-million increase in final demand for red meat products adds only 504 meat packing jobs in Greeley, Colorado. And, the impact is even less in Garden City or Dodge City, Kansas, where only 447 red meat packing jobs are added.

Furthermore, the impact of increased final demand for meat products on employment in both the service-providing sector (transportation, communications, and public utilities; wholesale and retail trade; finance, insurance, and real estate; and service industry) and on the economy as a whole is larger for the poultry industry than the red meat industry. For example, in Harrison, Arkansas, where the effect on the service sector is the smallest among poultry areas, only 497 service-providing jobs are added. But these are more jobs than the 345 service-providing jobs gained in Greeley, Colorado, where the effect on the service sector is the largest among all red meat areas. And, the increase in total employment of 1,679 jobs in Harrisonburg, Virginia, where the overall effect is the smallest among poultry areas, is greater than the 1,275 jobs gained in Greeley, Colorado, with the largest effect among red meat areas.

If we seek to understand the *individual* impact of an increase in final demand for meat products, we must calculate employment multipliers. An employment multiplier predicts how much total employment is increased in the regional economy for each additional job that is added in either the red meat packing or the poultry processing industry. Such a multiplier is comprised of three elements: a direct effect, an indirect effect, and an induced effect. The direct effect is the change in the number of actual production jobs in, say, the red meat packing industry that would be necessary to satisfy the change in increased customer demand. The indirect effect, however, affects the suppliers rather than the producers; for example, this effect would be felt by the suppliers to the red meat packing industry as a result of the rising customer demand. The third effect, the induced effect, is caused by the ensuing changes in household income generated from the combined direct and indirect effects (for example, as additional workers in the red meat packing industry and its suppliers purchase more goods and services from the rest of the economy). The employment multiplier is calculated by dividing the direct, indirect, and induced effects by the direct effect.

Employment multipliers for 10 selected trading areas suggest that the effect of each additional meat processing job on the economy is not significantly different for areas specializing in the red meat industry than for those specializing in the poultry industry (table 5). For example, for every additional red meat packing job in the Rockford and Galesburg, Illinois, trading areas, 1.7 jobs are generated in the regional economy (not counting the production job itself).[13] And, in the Garden City and Dodge City, Kansas, economies, with the smallest employment multipliers among red meat

[11]Since IMPLAN assumes constant returns to scale, the relationship between final demand and employment for a particular industry is linear. Hence the number of jobs added for an arbitrary $100-million increase is simply 100 times the number added for a $1-million increase.

[12]Base year employment data from (21) and (22) were considered more accurate than those available in IMPLAN and were substituted into the input-output model.

[13]For each additional meat processing job, the number of jobs added to the rest of the economy is equal to the sum of the individual components of the employment multiplier, as shown in table 5 (which excludes the direct effect of the red meat packing/poultry processing job itself).

Table 4—Employment effects of a $100-million increase in final demand in the red meat packing and poultry processing industries for selected trading areas, 1985

Item	Red meat industry					Poultry industry				
	Greeley, CO	Garden City, KS	Dodge City, KS	Rockford, IL	Galesburg, IL	Fayetteville-Springdale-Rogers, AR	Harrison, AR	Harrisonburg, VA	Salisbury, MD	Gainesville, GA
	Number									
Jobs created:										
Farming, total	395	290	253	431	417	481	539	218	847	504
Poultry	0	0	0	0	1	457	492	183	674	489
Cattle, except feedlots	88	91	92	76	76	1	2	3	0	0
Cattle feedlots	203	160	131	166	171	0	0	0	0	0
Hogs	18	16	11	108	110	0	1	1	0	0
Feed grains	9	12	9	22	27	3	6	1	1	2
Manufacturing, total	514	455	450	477	469	872	837	883	941	852
Poultry processing	0	0	0	0	0	828	788	829	910	790
Red meat packing	504	447	447	449	450	0	0	1	0	0
Service providing	345	234	297	265	289	620	497	542	687	571
Total	1,275	996	1,015	1,188	1,191	2,014	1,901	1,679	2,523	1,964
	Percent									
Effects on economy:										
Effect on total employment	2.8	3.4	5.9	.7	4.1	2.4	7.0	4.3	3.7	3.2
Effect on total income	2.0	2.9	5.1	.5	3.4	2.1	6.1	3.2	3.2	3.0

Note: Totals include some industries not shown in the table.

Table 5—Employment multipliers in the red meat packing and poultry processing industries, selected trading areas

Industrial sector	Red meat industry					Poultry industry				
	Greeley, CO	Garden City, KS	Dodge City, KS	Rockford, IL	Galesburg, IL	Fayetteville-Springdale-Rogers, AR	Harrison, AR	Harrisonburg, VA	Salisbury, MD	Gainesville, GA
	Number									
Livestock raising/ poultry farming[1]	0.6	0.6	0.5	0.9	0.9	0.6	0.6	0.2	0.8	0.6
Cattle, except feedlots	.2	.2	.2	.2	.2	--	--	--	--	--
Cattle feedlots	.4	.4	.3	.4	.4	--	--	--	--	--
Hogs	0	0	0	.3	.3	--	--	--	--	--
Feed grains	0	0	0	.1	.1	0	0	0	0	0
Red meat packing/ poultry processing[2]	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.1	1.0	1.0
Service producing	.7	.5	.7	.6	.7	.8	.7	.7	.8	.8
Backward	.2	.2	.2	.2	.2	.2	.2	.1	.2	.2
Forward	.5	.3	.5	.4	.5	.6	.5	.6	.6	.6
Total employment multiplier[3]	2.6	2.3	2.3	2.7	2.7	2.7	2.5	2.1	2.8	2.6

-- = Not applicable.
[1]Livestock raising for red meat areas and poultry farming for poultry areas.
[2]Red meat packing for red meat areas and poultry processing for poultry areas.
[3]Total employment multiplier includes some industries not shown in the table.

areas, each additional red meat packing job adds 1.3 jobs to the regional economy (again, not counting the production job). Among poultry areas, Salisbury, Maryland, has the largest employment multiplier, with each additional poultry processing job creating 1.8 jobs in the rest of the economy. And, in Harrisonburg, Virginia, with the smallest employment multiplier, each additional poultry processing job generates 1.1 new jobs in the region.

If we wish to better understand the ramifications in employment caused by additional jobs in meat processing, we must more fully discuss the economic linkages between meat processing and other industries. Two types of linkages should be considered: backward and forward linkages. Backward linkages are the direct and indirect components of the multiplier (shown in table 5). The indirect components show which industries provide inputs and act as suppliers to the meat processing industries. Such primary backward linkages indicate the potential of the most important input industries to create additional jobs in areas which specialize in red meat packing or poultry processing. The primary backward-linked industries in the red meat packing industry, for example, are cattle, cattle feedlots, hogs (in the Illinois trading areas), and feed grains. Increased final customer demand for red meat products will therefore create added jobs in areas with large cattle, cattle feedlot, hog (in Illinois), and feed grain industries. Such a gain in jobs can come about, however, only where input industries are large enough to sufficiently meet increased demand; otherwise, economic leakages to other regions will take place. When this occurs, if increased local demand for red meat products is to be met, imports of these primary-linked inputs must be channeled into the regional economy.[14] The argument is analogous for the poultry processing industry, except that poultry farming replaces the livestock industry.

Within the red meat packing industry, only small differences appear among areas in the size of the backward linkages. For example, for each additional red meat packing job that is created, between 0.5 livestock (cattle and cattle feedlot) jobs in Dodge City, Kansas, and 0.6 in Greeley, Colorado, and Garden City, Kansas, are added. When the hog component is taken into account, the size of the backward linkage increases only slightly for areas in Illinois. For instance, for each additional red meat packing job, only 0.9 livestock jobs (cattle, cattle feedlot, and hog farming) are added in Rockford and Galesburg, Illinois. Also, in the feed grain industry, significant job increases are created only in Illinois trading areas, which shows the comparative importance of this industry in the Corn Belt.

Only small differences in the size of the backward linkages appear between the red meat and poultry industries (table 5). For example, in the poultry industry, for each additional processing job, between 0.2 poultry farming jobs in Harrisonburg, Virginia, and 0.8 in Salisbury, Maryland, are added. And, no jobs are created in the feed grain industry, which reveals the insignificance of this industry in these areas.

Forward linkages are the induced effects (or components) of the multiplier and can be attributed primarily to the service-providing industries, that is, those local industries that provide goods and services to the added jobholders (app. table 5). For example, new jobs in the red meat packing and poultry processing industries and in the suppliers to these industries cause local income and employment to increase, which stimulates spending in the surrounding economy (induced effect) and locally creates even more jobs in the overall economy.

Differences between the forward linkages in the red meat and poultry industries are small. For example, each additional red meat packing job that is created brings with it only 0.3 forward-linked service-providing jobs in Garden City, Kansas, and only 0.5 such jobs in Greeley, Colorado, Dodge City, Kansas, and Galesburg, Illinois. And, in poultry areas, for each additional processing job, only 0.5 forward-linked service-providing jobs are added in Harrison, Arkansas and 0.6 in all other areas.

Therefore, the *individual* effect of each additional meat processing job is apparently not very different for the red meat packing industry and the poultry processing industry. But, the *overall* employment effect of a $100-million increase in final customer demand is much larger for the poultry industry. This effect comes about largely because poultry processing is considerably more labor intensive than red meat packing. The number of processing employees per million dollars of output in the poultry processing industry ranges between eight for Fayetteville-Springdale-Rogers, Arkansas, and nine

[14]Imports refer to goods brought in from outside the regional economy, without regard to whether they are produced within the United States or abroad.

for Salisbury, Maryland.[15] In contrast, the ratio is much smaller for the red meat packing industry: between four such employees for most areas and five for Greeley, Colorado.

Differing levels of labor intensity also help explain why Greeley, Colorado, had the largest regional employment effect among red meat areas. With the highest level of labor intensity, as measured by red meat packing employees per million dollars of output, an increase in final demand for red meat products has a larger relative impact on employment in Greeley than in any other red meat area, all other things being equal. Similarly, in Salisbury, Maryland, with the highest level of labor intensity among poultry areas, an increase in final demand for poultry processing results in a larger regional employment effect than for any other poultry area.

In summary, although each additional red meat packing job adds about the same number of jobs to the local economy as each additional poultry processing job, because of greater labor intensity in poultry processing, an increase in final consumer demand for meat products has a larger *direct* effect in the poultry industry than in the red meat packing industry. And, the larger *indirect* effect for poultry processing areas leads to a bigger *induced* effect, as workers in both the poultry industry and its suppliers demand more goods and services from the rest of the economy.[16]

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[15]Labor intensity is measured in terms of employees per *value* of product rather than employees per *volume* of product. This definition assumes that the labor intensity of the red meat and poultry industries does not vary when measured by value versus volume.

[16]These results are based on the findings of only 10 counties. And, although they were selected on the basis of being representative of the meat processing industry, the choice of these counties might include unintentional biases.

The employment effects assume that the regional economic diversity (that is, places in the economy where money is spent) is the same for red meat trading areas as for poultry areas.

Conclusions

This study has important implications for rural development. For several reasons, the overall potential of the red meat packing industry for creating jobs in nonmetro America is limited. First, although some counties associated with this industry have grown, the growth has largely resulted from the movement of processing activity to lower cost areas nearer the source of raw inputs. The employment base of the red meat packing industry has generally declined. Second, this study shows that a change in final consumer demand for meat products has a smaller overall employment effect in the red meat packing industry than in poultry processing (among counties that have maintained processing facilities since at least the mid-1970's).

In contrast, the poultry processing industry, fueled by increased per capita consumption, is expected to continue growing in nonmetro areas. As a result, the industry offers more potential for creating jobs. Also, this study reveals that a larger employment effect occurs in the poultry processing industry than in red meat packing when consumer demand for meat products increases. But, to a large extent, this greater regional effect takes place because of the higher degree of labor intensity in poultry processing. If this industry were to become considerably less labor intensive (for example, if labor were to become relatively more expensive, necessitating the need to substitute capital, such as more advanced machinery, for labor), the regional employment effect in the poultry processing industry would probably decrease. Therefore, areas interested in using the poultry processing industry as an economic development strategy should first accurately assess the local potential for growth, while keeping in mind regional production capabilities and the limitations of the industry.

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Appendix table 1—Production and processing for red meat counties

County/State/ major industry[1]	Fed cattle or hog sales 1978	Fed cattle or hog sales 1987	Total agricultural sales 1978	Total agricultural sales 1987	Cattle or hog sales as share of total sales 1978	Cattle or hog sales as share of total sales 1987	Red meat processing employment (jobs) 1975	Red meat processing employment (jobs) 1988	Agriculture and red meat processing employment as share of total employment 1975	Agriculture and red meat processing employment as share of total employment 1988
	------1,000 dollars------				------Percent------		------Number------		------Percent------	
Logan, CO (C)	91,569	126,533	137,097	191,184	66.8	66.2	345	258	22.9	16.7
Morgan, CO (C)	138,034	206,503	200,016	276,230	69.0	74.8	548	1,270	25.1	25.6
Weld, CO (C)	540,023	463,103	817,654	864,605	66.0	53.6	1,356	1,874	19.1	13.9
Canyon, ID (C)	64,825	92,076	177,750	249,070	36.5	37.0	283	340	14.1	11.3
Cass, IL (H)	12,942	22,652	45,904	60,251	28.2	37.6	854	595	28.0	23.0
Ogle, IL (C)	31,665	37,285	120,092	130,950	26.4	28.5	794	629	19.7	13.9
Warren, IL (H)	18,171	16,534	83,408	80,468	21.8	20.5	360	366	23.2	18.8
Cass, IN (H)	11,081	17,144	48,556	59,641	22.8	28.7	781	1,298	14.7	14.5
Crawford, IA (C)	33,426	29,180	106,064	111,095	31.5	26.3	550	1,445	39.2	34.7
Louisa, IA (H)	12,283	12,750	47,579	42,271	25.8	30.2	311	1,184	35.3	40.8
Plymouth, IA (C)	56,292	50,291	159,243	183,614	35.3	27.4	129	127	31.6	22.6
Shelby, IA (C)	30,435	27,701	95,937	108,594	31.7	25.5	157	133	31.2	25.2
Sioux, IA (C)	151,195	149,468	283,840	348,597	53.3	42.9	267	483	28.0	23.5
Tama, IA (H)	26,482	27,920	101,128	105,643	26.2	26.4	221	250	35.0	28.9
Cowley, KS (C)	20,571	14,242	60,503	55,906	34.0	25.5	700	569	15.3	10.4
Finney, KS (C)	135,727	321,509	196,130	381,532	69.2	84.3	201	3,747	15.5	27.0

See footnote and sources at end of table.

Continued—

Appendix table 1—Production and processing for red meat counties—Continued

County/State/ major industry[1]	Fed cattle or hog sales		Total agricultural sales		Cattle or hog sales as share of total sales		Red meat processing employment (jobs)		Agriculture and red meat processing employment as share of total employment	
	1978	1987	1978	1987	1978	1987	1975	1988	1975	1988
	1,000 dollars				*Percent*		*Number*		*Percent*	
Ford, KS (C)	123,934	179,351	180,253	229,083	68.8	78.3	172	2,062	14.2	20.2
Lyon, KS (C)	11,294	20,564	40,370	58,178	28.0	35.3	1,867	2,029	20.0	16.1
Seward, KS (C)	75,912	83,853	95,506	130,390	79.5	64.3	642	2,047	13.2	21.7
Freeborn, MN (H)	24,569	30,456	108,089	112,422	22.7	27.1	1,695	1,214	31.5	22.9
Mower, MN (H)	18,753	24,400	88,765	102,528	21.1	23.8	3,377	1,849	31.9	22.6
Nobles, MN (H)	19,891	28,133	97,054	115,008	20.5	24.5	308	1,323	31.9	29.2
Rock, MN (C)	22,055	24,471	69,609	87,789	31.7	27.9	149	305	34.1	32.8
Buffalo, NE (C)	45,686	47,262	101,847	122,394	44.9	38.6	118	181	12.6	10.2
Colfax, NE (C)	48,764	78,429	88,791	127,772	54.9	61.4	533	1,292	39.3	44.2
Cuming, NE (C)	163,121	248,816	228,282	338,229	71.5	73.6	288	352	43.8	33.8
Dodge, NE (C)	35,284	38,213	89,711	104,512	39.3	36.6	1,257	963	20.4	14.4
Madison, NE (C)	28,564	30,103	71,838	82,570	39.8	36.5	441	1,284	12.0	13.1
Yankton, SD (H)	8,392	12,522	36,463	50,538	23.0	24.8	100	250	12.8	11.3
Hale, TX (C)	46,209	53,225	143,049	160,277	32.3	33.2	656	1,488	25.8	20.3
Parmer, TX (C)	258,863	260,050	349,545	342,562	74.1	75.9	323	1,638	54.8	52.9
Yakima, WA (C)	74,119	107,415	357,587	498,067	20.7	21.6	280	110	23.2	19.6

[1]Counties are classified as either cattle or hog counties and are designated (C) or (H). In the case of counties which have both "significant" (see text for definition) cattle and hog industries, the county is classified according to the industry which has greater sales.

Sources: (20) and (21).

Appendix table 2—Production and processing for poultry counties

County/State/ major industry	Poultry sales		Total agricultural sales		Poultry sales as share of total sales		Poultry processing employment (jobs)		Agriculture and poultry processing employment as share of total employment	
	1978	1987	1978	1987	1978	1987	1975	1988	1975	1988
	1,000 dollars				Percent		Number		Percent	
Cleburne, AL	10,202	18,998	11,980	22,843	85.2	83.2	176	309	23.6	22.5
Coffee, AL	24,685	51,717	50,875	73,123	48.5	70.7	395	1,007	13.5	10.6
Cullman, AL	100,559	175,785	121,643	197,005	82.7	89.2	695	641	25.9	13.8
Marshall, AL	51,571	92,649	66,287	104,974	77.8	88.3	1,043	2,800	17.8	14.8
Benton, AR	97,553	199,986	130,506	263,484	74.7	75.9	1,262	2,641	17.5	13.2
Carroll, AR	26,079	55,312	43,048	80,488	60.6	68.7	828	2,170	39.3	35.6
Hempstead, AR	59,429	96,831	69,987	107,614	84.9	90.0	100	615	21.0	20.7
Independence, AR	23,908	28,815	41,791	46,895	57.2	61.4	401	766	18.8	12.7
Johnson, AR	11,618	35,519	16,665	43,168	69.7	82.3	215	1,190	20.6	29.6
Pike, AR	21,195	26,043	25,209	31,115	84.1	83.7	175	371	28.1	23.0
Polk, AR	33,084	53,894	38,971	63,817	84.9	84.5	332	146	24.6	16.8
Scott, AR	15,562	37,623	20,351	42,975	76.5	87.5	171	1,139	27.7	47.7
Sevier, AR	26,824	50,560	32,858	58,081	81.6	87.1	366	1,258	25.2	34.2
Washington, AR	154,757	245,398	185,092	298,699	83.6	82.2	1,883	2,613	14.3	10.6
Yell, AR	34,112	64,174	44,909	75,315	76.0	85.2	799	2,671	41.6	47.8
Merced, CA	132,196	171,459	460,073	792,105	28.7	21.6	1,104	925	29.8	17.0
Sussex, DE	177,462	274,627	236,872	329,552	74.9	83.3	1,349	3,389	14.0	12.3
Suwannee, FL	19,247	35,477	42,411	64,064	45.4	55.4	531	674	29.4	22.6
Barrow, GA	17,338	34,618	20,189	37,883	85.9	91.4	369	591	15.0	11.5
Cherokee, GA	30,012	34,095	34,696	41,468	86.5	82.2	499	1,040	17.6	10.5
Coffee, GA	28,983	23,963	61,159	56,222	47.4	42.6	1,241	1,284	35.2	19.6
Forsyth, GA	45,820	56,123	48,781	59,191	93.9	94.8	315	698	23.7	12.5
Habersham, GA	28,639	68,050	30,787	73,646	93.0	92.4	371	1,409	12.1	15.0
Hall, GA	71,595	126,287	78,201	134,406	91.6	94.0	1,931	4,329	13.3	11.9
Jackson, GA	41,756	71,618	47,627	79,501	87.7	90.1	165	166	19.4	12.7

See sources at end of table

Continued—

Appendix table 2—Production and processing for poultry counties—Continued

County/State/ major industry	Poultry sales		Total agricultural sales		Poultry sales as share of total sales		Poultry processing employment (jobs)		Agriculture and poultry processing employment as share of total employment	
	1978	1987	1978	1987	1978	1987	1975	1988	1975	1988
	----------1,000 dollars----------				------Percent------		------Number------		------Percent------	
Worcester, MD	79,005	100,375	97,536	122,048	81.0	82.2	1,271	1,012	25.0	12.3
Becker, MN	8,689	25,624	42,480	74,532	20.5	34.4	347	716	24.3	21.5
Kandiyohi, MN	35,287	75,879	103,031	155,102	34.2	48.9	455	1,455	20.7	16.9
Covington, MS	14,096	10,805	20,878	17,391	67.5	62.1	609	645	37.1	30.4
Leake, MS	33,224	43,105	41,601	50,236	79.9	85.8	152	322	30.9	22.5
Scott, MS	59,312	97,146	68,137	103,861	87.0	93.5	1,853	2,718	43.0	34.7
McDonald, MO	25,324	48,350	39,997	70,030	63.3	69.0	656	1,238	42.8	39.6
Newton, MO	12,711	42,064	35,612	68,984	35.7	61.0	165	771	15.4	16.2
Chatham, NC	50,136	70,379	65,015	88,302	77.1	79.7	447	500	22.8	14.7
Duplin, NC	95,364	129,388	173,125	214,865	55.1	60.2	345	926	38.7	25.0
Union, NC	87,069	144,372	114,757	170,687	75.9	84.6	1,014	2,849	18.8	13.0
Wilkes, NC	86,556	121,447	96,571	132,337	89.6	91.8	1,499	3,125	18.0	17.0
Delaware, OK	11,057	35,537	26,809	60,741	41.2	58.5	133	132	28.2	18.8
McCurtain, OK	24,223	52,470	39,538	71,088	61.3	73.8	663	1,196	20.6	24.0
Newberry, SC	12,104	23,117	25,221	40,563	48.0	57.0	388	1,138	15.6	17.1
Gonzales, TX	75,153	115,009	99,942	163,386	75.2	70.4	320	356	38.7	30.1
Shelby, TX	55,129	80,562	62,275	89,273	88.5	90.2	746	750	34.7	24.4
Accomack, VA	12,419	19,502	38,911	49,722	31.9	39.2	1,553	2,500	28.5	25.3
Page, VA	11,830	36,306	16,782	44,869	70.5	80.9	144	180	13.7	12.4
Rockingham, VA	98,621	189,831	154,295	277,168	63.9	68.5	2,050	2,986	22.0	15.1
Shenandoah, VA	15,450	24,468	29,884	44,963	51.7	54.4	578	800	19.7	15.3
Hardy, WV	12,863	31,395	18,755	40,270	68.6	78.0	130	1,191	38.0	44.0

Sources: (20) and (21).

Appendix table 3—Red meat and poultry counties and adjacent counties for selected Rand McNally areas

Red meat industry					Poultry industry				
Rand McNally area									
Greeley, CO	Garden City, KS	Dodge City, KS	Rockford, IL	Galesburg, IL	Fayetteville-Springdale-Rogers, AR	Harrison, AR	Harrisonburg, VA	Salisbury, MD	Gainesville, GA
County									
Weld[1]	Finney[1]	Clark	Boone	Knox	Benton[2]	Boone	Page[2]	Dorchester	Banks
	Grant	Ford[1]	Lee	Warren[1]	Madison	Carroll[2]	Rockingham[2]	Somerset	Dawson
	Greeley	Gray	Ogle[1]		Washington[2]	Marion	Harrisonburg (City)	Wicomico	Habersham[2]
	Hamilton	Hodgeman	Stephenson			Newton		Worcester[2]	Hall[2]
	Haskell		Winnebago			Searcy	Hardy, WV[2]		Lumpkin
	Kearney						Pendleton, WV		White
	Lane								
	Scott								
	Stanton								
	Wichita								

Note: Counties are in the same State as the Rand McNally area unless otherwise noted.

[1]Red meat county; see text for definition.

[2]Poultry county; see text for definition.

Source: (12)

Appendix table 4—Regional employment for selected trading areas in the red meat packing and poultry processing industries, 1985

	Red meat industry					Poultry industry				
Industrial sector	Greeley, CO	Garden City, KS	Dodge City, KS	Rockford, IL	Galesburg, IL	Fayetteville-Springdale-Rogers, AR	Harrison, AR	Harrisonburg, VA	Salisbury, MD	Gainesville, GA
	Number									
Farming, total	6,229	6,747	3,220	8,473	3,156	8,968	5,483	2,385	4,631	4,090
Poultry	120	21	12	94	46	6,020	2,030	938	2,361	3,126
Cattle, except feedlots	339	775	423	152	122	308	437	254	16	72
Cattle feedlots	1,408	1,760	631	398	316	26	37	26	1	5
Hogs	50	124	52	541	524	79	221	42	27	13
Feed grains	428	454	260	2,803	1,326	76	115	45	20	38
Manufacturing, total	7,040	4,446	2,638	63,185	5,592	19,789	5,961	14,004	14,728	20,909
Poultry processing	0	0	0	0	0	4,625	1,403	4,152	3,087	4,963
Red meat packing	1,272	3,331	1,943	731	655	11	0	53	0	5
Service providing	19,106	11,241	7,641	81,877	14,932	36,496	10,590	18,118	33,806	22,988
Total	46,181	29,375	17,363	178,609	28,910	83,082	27,056	39,310	67,848	61,748

Note: Totals include some industries not shown in the table.
Sources: (21) and (22).

Appendix table 5—Direct, indirect, and induced employment effects of a $100-million increase in final demand in the red meat packing and poultry processing industries for selected trading areas, 1985

	Red meat industry					Poultry industry				
Industrial sector	Greeley, CO	Garden City, KS	Dodge City, KS	Rockford, IL	Galesburg, IL	Fayetteville-Springdale-Rogers, AR	Harrison, AR	Harrisonburg, VA	Salisbury, MD	Gainesville, GA
	Number									
Direct employment:										
Red meat packing	490	435	435	438	438	0	0	0	0	0
Poultry processing	0	0	0	0	0	749	771	789	890	757
Indirect employment:										
Farming, total	390	289	252	428	414	476	531	209	836	497
Poultry	0	0	0	0	1	455	490	182	671	487
Cattle, except feedlots	88	91	92	76	76	1	2	1	0	0
Cattle feedlots	202	160	131	166	170	0	0	0	0	0
Hogs	18	16	11	108	110	0	1	0	0	0
Feed grains	9	12	9	22	27	3	6	1	1	2
Manufacturing, total	17	18	13	24	23	100	45	65	28	69
Poultry processing	0	0	0	0	0	76	14	38	17	31
Red meat packing	12	11	11	10	11	0	0	0	0	0
Service providing	93	87	101	100	103	197	137	91	182	156
Total	508	403	373	560	547	794	726	379	1,065	738

See note at end of table.

Continued—

Appendix table 5—Direct, indirect, and induced employment effects of a $100-million increase in final demand in the red meat packing and poultry processing industries for selected trading areas, 1985—Continued

Industrial sector	Red meat industry					Poultry industry				
	Greeley, CO	Garden City, KS	Dodge City, KS	Rockford, IL	Galesburg, IL	Fayetteville-Springdale-Rogers, AR	Harrison, AR	Harrisonburg, VA	Salisbury, MD	Gainesville, GA
	Number									
Induced employment:										
Farming, total	5	1	1	3	3	5	8	9	11	7
Poultry	0	0	0	0	0	2	2	1	3	2
Cattle, except feedlots	0	0	0	0	0	0	0	2	0	0
Cattle feedlots	1	0	0	0	1	0	0	0	0	0
Hogs	0	0	0	0	0	0	0	1	0	0
Feed grains	0	0	0	0	0	0	0	0	0	0
Manufacturing, total	7	2	2	15	8	23	21	29	23	26
Poultry processing	0	0	0	0	0	3	3	2	3	2
Red meat packing	2	1	1	1	1	0	0	1	0	0
Service providing	252	147	196	165	186	423	360	451	505	415
Total	277	158	207	190	206	471	404	511	568	469

Note: Totals include some industries not shown in the table.

U.S. Department of Agriculture
Economic Research Service

SUMMARY OF REPORT

U.S. Farm Sector Continues Financial Recovery

Number 4, December 1992

Contact: Mitchell Morehart (202) 219-0800

In 1990, U.S. farm businesses continued to recover from the financial problems encountered during the early and mid-1980's, according to the most recent Farm Costs and Returns Survey. Based on their overall financial performance, a combination of net cash farm income and debt/asset ratio, farm businesses in 1990 were in the strongest financial condition since 1984.

Gross income more than kept pace with rising expenses, even with dramatic reductions in Government support. Following widespread drought in 1988, average net incomes rebounded strongly in 1989 and 1990. After several years of reductions in the use of debt capital, 1990 saw a moderate rise in debt-financed capital purchases. Farm businesses were also in a better position to service debt in 1990 than at any other time during the 1987-90 period.

Number of Vulnerable Farms Down

Each year, a segment of farms experiences extreme financial difficulties, but the size of that segment has been steadily declining over the past few years. Roughly 7 percent of farms entered 1991 in a vulnerable financial position, having a relatively high amount of debt in combination with negative net income. This level of vulnerability compares with 11.6 percent in 1986.

Nearly two-thirds of vulnerable farms had gross sales below $40,000. These small, part-time operations are perhaps better able to cope with farm financial difficulties, since many have access to off-farm earnings to support their farm business.

Even though the composition of vulnerable farms has not changed much with regard to farm size, the geographic locations and production specialties associated with vulnerable farms have changed considerably since 1987. The Corn Belt had the largest concentration of vulnerable farms in both 1987 and 1990, yet its share of vulnerable farms went from 22 percent in 1987 to 16 percent in 1990. The Lakes States also had a substantial reduction in the share of vulnerable farms. In contrast, the Southeast and Southern Plains regions had the largest 1987-90 increase in vulnerable farms.

The proportion of vulnerable farms that specialized in cash grains dropped from 26 percent in 1987 to 18 percent in 1990, the largest reduction for any production specialty.

Incomes Vary by Region and Commodity

The highest average net farm income occurred in the Northern Plains, Mountain, and Pacific regions. Increases in expenses outpaced income growth in 1990 for farms in the Northeast, Southeast, and Mountain regions, resulting in lower average net farm income than in 1989. Production specialties that, on average, had their most profitable year (since 1987) in 1990 were: tobacco; vegetables, fruits, or tree nuts; nursery or greenhouse; beef, hogs, or sheep; and other livestock.

To Order This Report...

The information presented here is excerpted from ***Financial Performance of U.S. Farm Businesses, 1987-90,*** AER-661, by Mitchell J. Morehart, James D. Johnson, and David E. Banker. The cost is $14.00.

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U.S. Department of Agriculture
Economic Research Service

SUMMARY OF REPORT

New State Rankings by Receipts from Agricultural Commodities

Number 3, December 1992

Cattle and calves, dairy products, corn, hogs, and soybeans were the leading agricultural commodities (in terms of farm cash receipts) in 1991. Those commodities had the same ranking in 1990. The leading States for each commodity were as follows:

- Cattle and calves: Texas, Nebraska, Kansas, Colorado, and Oklahoma.
- Dairy products: Wisconsin, California, New York, Pennsylvania, and Minnesota.
- Corn: Illinois, Iowa, Nebraska, Indiana, and Minnesota.
- Hogs: Iowa, Illinois, Minnesota, Nebraska, and Indiana.
- Soybeans: Illinois, Iowa, Minnesota, Indiana, and Ohio.

Those findings come from a new report by USDA's Economic Research Service, *Ranking of States and Commodities by Cash Receipts, 1991*. One set of tables lists the 25 leading agricultural commodities produced in each State and the United States, ranked by value of cash receipts. Another set of tables lists the major producing States for each of the 25 leading commodities and for several major commodity groupings.

Thirty States had livestock receipts exceeding crop receipts in 1991. In 13 States, the majority of receipts was from sales of a single commodity, indicating a high degree of dependence on the production and market conditions for that commodity.

Commodity Dependence

In 11 States, one livestock commodity had receipts for more than 50 percent of the State's total receipts. Wyoming showed 73 percent of its agricultural receipts as coming from **cattle and calves**; Kansas, 62 percent; Colorado, 60 percent; Oklahoma, 58 percent; Nebraska, 54 percent; Nevada, 51 percent; Texas, 51 percent; and New Mexico, 50 percent. **Dairy** accounted for 72 percent of receipts in Vermont and 52 percent of receipts in Wisconsin. Delaware relied on **broilers** for 63 percent of receipts. In two States, **greenhouse/nursery** products accounted for more that 50 percent of the State's total receipts: Alaska (57 percent) and Rhode Island (55 percent).

Agricultural Diversity

Eight States had sufficient diversification in their agricultural production that the leading commodity accounted for no more than 20 percent of sales receipts. The States and their two leading commodities were: California, dairy (14 percent) and greenhouse (11 percent); Oregon, cattle (18) and greenhouse (15); Florida, oranges (19) and greenhouse (16); South Carolina, tobacco (16) and cattle (11); Minnesota, corn (18) and dairy (17); Virginia, cattle (20) and broilers (15); Ohio, soybeans (20) and corn (20); and Washington, apples (20) and dairy (14).

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SUMMARY OF REPORT

Off-farm Income Is Critical to Most Farm Operator Households

Number 8, February 1993

Contact: Mary Ahearn, 202/219-0306

Farm household income, at $39,007 from both farm and off-farm sources in 1990, is on par with average U.S. household income, according to the Economic Research Service's *The Economic Well-Being of Farm Operator Households, 1988-90.*

The average off-farm income of farm operator households in 1990 was $33,265, or 85 percent of their total household income. Only $5,742 of the total income for farm operator households in 1990 was income from their farms. Most of the off-farm income comes in the form of wages and salaries. In about 60 percent of farm operator households, either or both the farm operator or spouse earned off-farm wage and salary income.

The new report is based on USDA's Farm Costs and Returns Survey.

Nearly three-quarters of farm households operate small farms with gross sales below $50,000. These households lose money on their farms on average. Another 22 percent of farms would still be considered of modest size, with gross sales of $50,000 to $249,999. In 1990, most of these households had a positive return from their farms, averaging $16,236. Only 6.2 percent of farms had sales of $250,000 or more in 1990. Although they are small in number, these larger farms produced just over half of the agricultural commodities in the United States in 1990. Farm households reporting sales in the $250,000 to $499,999 range averaged $53,314 from their farms, and those with sales above $500,000 averaged $118,035.

The receipt of off-farm income has become one of the most important means for farm operator households to diversify their financial position and bring greater security to the household. Only about 20 percent of farm operator households received more income from the farm than off the farm in 1990, although another 10 percent of farm households lost more on their farm than they made off their farm. Small farm households earned the largest off-farm incomes at $37,276, but the off-farm incomes of those with very large farms (with more than $500,000 in sales) were not much lower, at $32,698.

Income of farm operator households and all U.S. households, 1990

Average income of farm operator households is on par with that of all U.S. households.

Item	Farm operator households	U.S. households
Number	1,738,019	94,312,000
	Percent	
Household income class:		
Less than $10,000	22.2	14.9
$10,000 - $24,999	27.2	27.2
$25,000 - $49,999	28.8	33.3
$50,000 and more	21.8	24.6
Below poverty threshold	21.9	13.5[1]
	Average dollars	
Household income	39,007	37,403

[1] For U.S. persons. The poverty rate for U.S. families was 10.7 percent in 1990.

To Order This Report...

The information presented here is excerpted from ***The Economic Well-Being of Farm Operator Households, 1988-90,*** AER-666, by Mary C. Ahearn, Janet E. Perry, and Hisham S. El-Osta. The cost is $15.00.

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